CLAIMS:

What is claimed is:

1. A method of providing network access to a mobile platform via at least one mobile node, each mobile node including at least two directional antennas for establishing communications

5   links with at least two disparate nodes, comprising:

    transmitting route data to a mobile node; and

    exchanging signals over links between a network interface and the mobile node;

    wherein the mobile node steers its directional antennas based on the route data to

establish the links with the network interface and the mobile platform.

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2. The method according to claim 1, wherein the mobile node steers its directional antennas to establish direct links with at least two other mobile nodes along a path between the network interface and the mobile platform.

15   3. The method according to claim 1, wherein the mobile node steers its directional antennas to establish at least one direct link with the network interface.

4. The method according to claim 1, wherein the mobile node steers its directional antennas to establish a direct link with the mobile platform.

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5. The method according to claim 1, wherein transmitting the route data is performed by a direct physical connection between the mobile platform and a data-link that is coupled to a source of route data.

6. The method according to claim 1, wherein the route data is transmitted from the network interface to the mobile node.

5　7. The method according to claim 1, wherein the route data is received via an omni-directional antenna, distinct from the directional antennas, from other mobile nodes within a predetermined distance of the mobile node.

8. The method according to claim 1, wherein the mobile node is a mobile platform.

9. The method according to claim 1, wherein the mobile node is a relay.

10. The method according to claim 1, wherein the network interface provides access to a digital broadcast service.

11. The method according to claim 1, wherein the network interface provides access to the Internet.

12. The method according to claim 1, wherein the network interface provides access to a

20　plurality of services including digital broadcast services, the Internet and electronic mail.

13. The method according to claim 12, wherein the network interface is a ground-based communications system.

14. The method to claim 13, wherein the ground-based communications system includes a plurality of antennas to establish a plurality of links with a plurality of mobile nodes within an area surrounding the ground-based communications system.

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15. The method according to claim 1, wherein the links between the ground-based communications system and the plurality of mobile nodes within an area surrounding the ground-based communications system are selected to optimize overall network performance based on an optimization criteria.

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16. The method according to claim 12, wherein the network interface is a satellite-based communications system.

17. The method according to claim 1, wherein the mobile platform is an aircraft.

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18. The method according to claim 1, wherein the mobile platform is a boat.

19. The method according to claim 1, wherein the mobile platform is a train.

20   20. The method according to claim 17, wherein the signals exchanged include cockpit data.

21. The method according to claim 17, wherein at least one of the directional antennas is attached at the front portion of the aircraft.

22. The method according to claim 17, wherein at least one of the directional antennas is attached at the bottom portion of the aircraft.

5 23. The method according to claim 17, wherein at least one of the directional antennas is attached at the top portion of the aircraft.

24. The method according to claim 17, wherein at least one of the directional antennas is attached at the rear portion of the aircraft.

10 25. The method according to claim 17, wherein the route table includes latitude, longitude, altitude, time, velocity and bearing data for at least some of the mobile nodes.

26. The method according to claim 24, wherein the route table further comprises a flight plan for
15 at least some of the mobile nodes.

27. The method according to claim 13, wherein the mobile nodes store latitude, longitude and altitude data for the ground based communications system and establish links with the ground based communications system based on the stored data.

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28. The method according to claim 17, wherein the mobile platform further comprises a local area network coupling user terminals to a server, the server transmitting data received from the network accessed by the network interface to the user terminals.

29. The method according to claim 27, wherein the server further transmits data received from the user terminals to the network accessed by the network interface.

5   30. The method according to claim 1, wherein the number of directional antennas on each mobile node is three.

31. A method of extending the coverage area of a network that is accessible via at least one network interface node by establishing links among the at least one network interface node and a plurality of mobile nodes, wherein each mobile node includes at least three directional antennas for creating links to other nodes to, the method at a mobile node comprising:

   determining possible links to other nodes based on route data for the nodes;

   scoring each remaining link;

   eliminating the lowest scoring links when the number of remaining links for the mobile node exceeds the maximum number of links permitted; and

   aiming the directional antennas of the mobile node to create the remaining links.

32. The method according to claim 30, further comprising:

   computing geometric data for each possible link; and

20   eliminating occluded links based on the geometric data.

33. The method according to claim 30, wherein the network interface nodes are situated at fixed, ground stations and the route data includes geographic data for each of the network interface nodes.

5   34. The method according to claim 30, wherein the network interface nodes are satellites and the route data further includes latitude, longitude, altitude, time, velocity and bearing data.

35. The method according to claim 30, wherein the route data includes latitude, longitude, altitude, time, velocity and bearing data for the mobile nodes.

10   36. The method according claim 30, wherein at least a portion of the route data is received by the mobile node via a separate antenna from nearby mobile nodes.

37. The method according to claim 30, wherein at least a portion of the route data is received by

15   the mobile node via a link to the network.

38. The method according to claim 30, wherein the mobile node establishes at least one link to the at least one network interface node based on the scoring.

20   39. The method according to claim 37, wherein the mobile node maximizes the number of links to the at least one network interface node based on the scoring.

40. The method according to claim 30, further comprising scoring the links to maximize the number of mobile nodes coupled to the network.

41. The method according to claim 30, wherein the scoring is performed iteratively to minimize the number of links and maximize connectivity to the network.

42. The method according to claim 30, wherein the scoring is performed based on a Dijkstra algorithm.

43. The method according to claim 30, wherein the mobile node is a mobile platform having a plurality of terminals coupled to the network via the links.

44. The method according to claim 42, wherein the network and links provide the terminals access to a digital broadcast service.

45. The method according to claim 42, wherein the network and links provide the terminals access to the Internet.

46. The method according to claim 42, wherein the network and links provide the terminals access to a plurality of services including digital broadcast services, the Internet and electronic mail.

47. The method according to claim 30, wherein the method is periodically repeated.

48. The method according to claim 30, wherein the method is repeated every two minutes.

49. The method according to claim 30, wherein the method is repeated upon the mobile platform

5   nearing a boundary of direct linking to a network interface node.

50. A mobile platform for accessing a network via at least one network interface node by

establishing links among the at least one network interface node and a plurality of mobile

nodes, wherein the mobile nodes include at least two directional antennas for creating links

10   to other nodes, mobile platform comprising:

a database for storing data including route data;

at least two directional antennas including control portions; and

a controller coupled to the database and the directional antennas, the controller a)

periodically reading the route data, b) determining links to other nodes and c) issuing control

15   signals to the directional antennas to cause the directional antennas to point at the other nodes

to establish links to the network.

51. The mobile platform according to claim 49, further comprising:

an omni-directional antenna coupled to the controller, wherein the controller is operative

20   to a) receive route data via the omni-directional antenna from neighboring mobile platforms and

b) store the route data in the database.

52. The mobile platform according to claim 49, further comprising:

a local area network coupled to the controller, the local area network being attachable to

terminals for exchanging data with the network via the links.

53. The mobile platform according to claim 52, wherein the network and links provide the

5   terminals access to a digital broadcast service.

54. The method according to claim 52, wherein the network and links provide the terminals

access to the Internet.

10   55. The method according to claim 52, wherein the network and links provide the terminals

access to a plurality of services including digital broadcast services, the Internet and

electronic mail.

56. A computer program product for causing a system on a node to establish links to other nodes,

15   including network interface nodes for accessing a network and mobile nodes, wherein each

node includes at least three directional antennas for creating links to other nodes, the

computer program product including a computer useable medium having computer program

logic therein, the computer program logic comprising:

determining means for causing a system to determine possible links to other nodes based

20   on route data for the nodes;

scoring means for causing the system to score each link;

eliminating means for causing the system to eliminate the lowest scoring links when the

number of links for the mobile node exceeds the maximum number of links permitted; and

aiming means for causing the computer to aim the directional antennas of the mobile

node to create the remaining links.

57. The computer program product according to claim 55, further comprising:

5   computing geometric data for each possible link; and

eliminating occluded links based on the geometric data.

58. The computer program product according to claim 55, wherein the network interface nodes

are situated at fixed, ground stations and the route data includes geographic data for each of

10   the network interface nodes.

59. The computer program product according to claim 55, wherein the network interface nodes

are satellites and the route data further includes latitude, longitude, altitude, time, velocity

and bearing data.

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60. The computer program product according to claim 55, wherein the route data includes

latitude, longitude, altitude, time, velocity and bearing data for the mobile nodes.

61. The computer program product according claim 55, further comprising receiving means for

20   causing the system to receive at least a portion of the route data via an omni-directional

antenna from nearby nodes.

62. The computer program product according to claim 55, further comprising receiving means for causing the system to receive at least a portion of the route data via a link.

63. The computer program product according to claim 55, further comprising establishing means

5   for causing the system to establish at least one link to the at least one network interface node based on the scoring.

64. The computer program product according to claim 62, wherein the scoring means maximizes causes the system to maximize the number of links to the at least one network interface node.

65. The computer program product according to claim 55, wherein the scoring means causes the system to maximize the number of mobile nodes coupled to the network.

66. The computer program product according to claim 55, wherein the scoring means causes the system to perform scoring iteratively to minimize the number of links and maximize connectivity to the network.

67. The computer program product according to claim 55, wherein the scoring means causes the system to perform the scoring based on a Dijkstra algorithm.

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68. The computer program product according to claim 55, wherein the node is a mobile platform having a plurality of terminals coupled to the network via the links.

69. The computer program product according to claim 67, wherein the network and links provide the terminals access to a digital broadcast service.

70. The computer program product according to claim 67, wherein the network and links provide

5 the terminals access to the Internet.

71. The computer program product according to claim 67, wherein the network and links provide the terminals access to a plurality of services including digital broadcast services, the Internet and electronic mail.

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72. The computer program product according to claim 55, wherein the system periodically repeats executing the computer program logic.

73. The computer program logic according to claim 55, wherein the system periodically repeats

15 executing the computer program logic method every two minutes.

74. The computer program logic according to claim 55, wherein the system repeats executing the computer program logic when a link is close to being broken.